

HIGH PERFORMANCE, LOW COST MICROPROCESSOR**ABSTRACT OF THE DISCLOSURE**

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Fig 2 A microprocessor (50) includes a main central processing unit (CPU) (70) and a separate direct memory access (DMA) CPU (72) in a single integrated circuit making up the microprocessor (50). The main CPU (70) has a first 16 deep push down stack (74), which has a top item register (76) and a next item register (78), respectively connected to provide inputs to an arithmetic logic unit (ALU) (80) by lines (82) and (84). An output of the ALU (80) is connected to the top item register (76) by line (86). The output of the top item register at (82) is also connected by line (88) to an internal data bus (90). A loop counter (92) is connected to a decremter (94) by lines (96) and (98). The loop counter (92) is bidirectionally connected to the internal data bus (90) by line (100). Stack pointer (102), return stack pointer (104), mode register (106) and instruction register (108) are also connected to the internal data bus (90) by lines (110), (112), (114) and (116), respectively. The internal data bus (90) is connected to memory controller (118) and to gate (120). The gate (120) provides inputs on lines (122), (124), and (126) to X register (128), program counter (130) and Y register (132) of return push down stack (134). The X register (128), program counter (130) and Y register (132) provide outputs to internal address bus (136) on lines (138), (140) and (142). The internal address bus provides inputs to the memory controller (118) and to an incrementer (144). The incrementer (144) provides inputs to the X register, program counter and Y register via lines (146), (122), (124) and (126). The DMA CPU (72) provides inputs to the memory controller (118) on line (148). The memory controller (118) is connected to a RAM by address/data bus (150) and control lines (152).

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